

**THE LARVA OF *SYMPETRUM MADIDUM* (HAGEN)
(ODONATA: LIBELLULIDAE)**

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Sympetrum madidum (Hagen) is a dragonfly widely distributed through much of western North America, ranging from the Northwest Territories south through British Columbia to California and east to Manitoba and Missouri (Walker and Corbet, 1975).

In 1904 J. G. Needham published a description of a single *Sympetrum* larva that he attributed by supposition to *S. madidum* (Needham, 1904). The characteristics of this larva subsequently were treated as those of *S. madidum* in other works (Byers, 1927; Needham and Westfall, 1955).

Recently, Walker and Corbet (1975) recognized that the *S. madidum* adult was similar to those of *S. corruptum* and *S. illotum* which were considered by Needham and Fisher (1936) and Needham and Westfall (1955) and others to belong to a separate genus, *Tarnetrum*. Consequently, Walker and Corbet (1975) placed *S. madidum* in a subgenus *Tarnetrum* within *Sympetrum*, agreeing with Gloyd and Wright (1959) and Kormondy (1958, 1960) in not giving *Tarnetrum* full generic rank.

The larvae of the subgenus *Tarnetrum* are different from those of other *Sympetrum* species: they are larger, have reduced lateral spines and lack dorsal hooks on the abdomen. Needham's larva was considerably smaller than the expected size of the larva of *S. madidum*, and moreover, had dorsal hooks and long lateral spines. This, as well as Needham's professed doubts as to the identity of the larva he described, led Walker and Corbet (1975) to disregard the 1904 description and consider the larva of *S. madidum* to be unknown.

On 19 June 1978 at Riske Creek, British Columbia (51°58', 122°30') I found a teneral *S. madidum* female with an exuvia about one m away. The association of adult and exuvia was not conclusive, however, and despite the fact that the exuvia fitted all the requirements for a larva of *S. madidum* (the other species in the subgenus are not known to occur anywhere near this region), no definite claim for the discovery of the larva could be made.

Similar larvae were collected from a pond in Langford, ten km west of Victoria, British Columbia (48°28', 123°30') on 3 June 1979. On 10 June an adult male and female *S. madidum* emerged from these larvae in the laboratory and another female did so on 11 June. A second collection of larvae from the same pond on 16 June produced ten more adults.

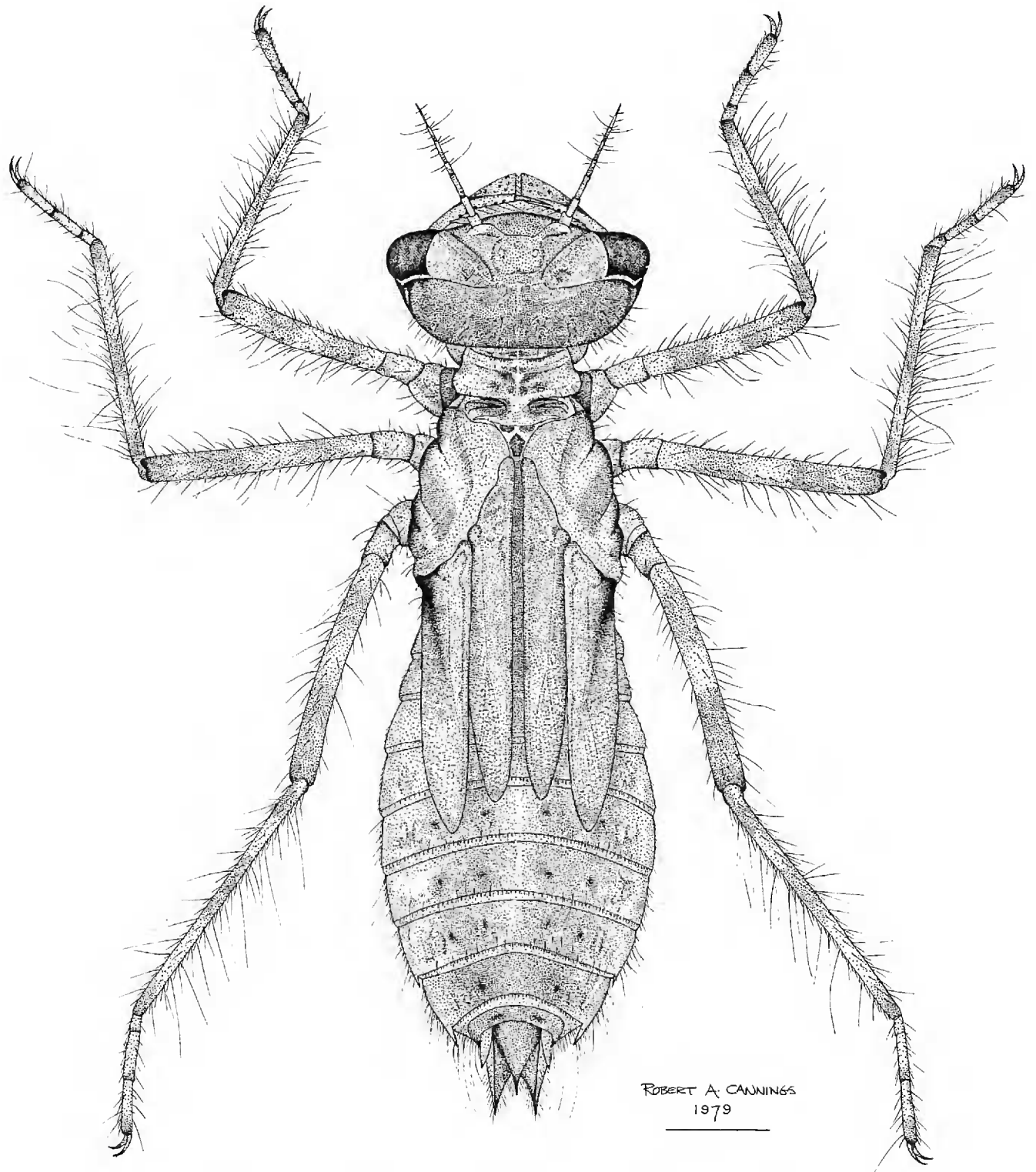


Fig. 1. *Sympetrum madidum*, final-instar larva, dorsal view. Scale line = 2 mm.

Sympetrum madidum (Hagen), final instar of larva
(Fig. 1)

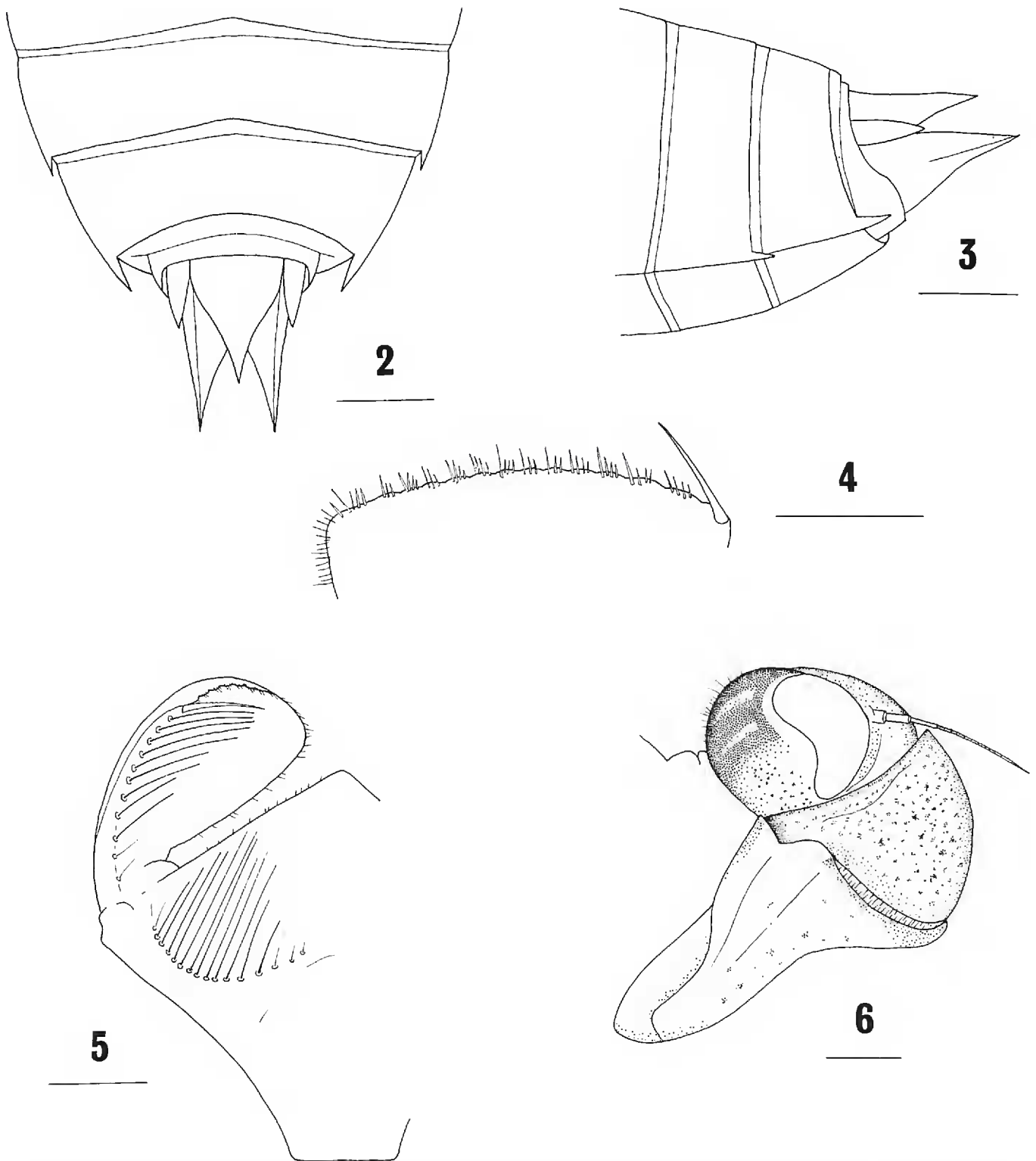
Description.—Male and female similar except in minor aspects of developing genitalia. Coloration described from living specimens. Those preserved in 70–80 percent ethanol lose all green color and light areas become yellow-brown; darker areas become medium to red-brown. Fresh exuviae are ash-brown. Total length 17.8–20.3 mm (19.0 ± 0.26 mm) (range with mean and standard error in parentheses; $n = 10$).

Head with dorsum brown; eyes brown with black stripes across ommatidia and bordered posteriorly by white bar (Fig. 6). Antennae with socket and segments 1 and 2 white, 3 brown, 4–6 brown with apices white, 7 white with apex black. Prementum and labial palps light brown, with scattered dark spots especially on the palps. Head 5.2–5.5 mm (5.3 ± 0.03 mm) across eyes, 2.7–2.8 mm (2.7 ± 0.02 mm) long at midline. Antennae with segments (from base) having mean lengths of 0.20, 0.33, 0.43, 0.22, 0.35, 0.59 and 0.49 mm. Division between segments 3 and 4 less distinct than between others; one exuvia from Riske Creek with segments 3 and 4 fused, giving 6 segments in total, the third segment measuring 0.53 mm. Labium as in Fig. 5 (terminology as in Corbet, 1953); venter of folded prementum (excluding hinge) 4.2–4.5 mm (4.3 ± 0.02 mm) long, 4.3–4.6 mm (4.4 ± 0.03 mm) at widest point and 1.0–1.2 mm (1.1 ± 0.02 mm) at base. Ratio of length to greatest width 0.95–1.0 (0.98 ± 0.01). Folded prementum extending posteriorly to middle of mesocoxae. Premental setae 13–18 (15.3 ± 0.30) on each side, the inner 2 or 3 usually minute; 8–10 very short setae on each side of non-crenulate distal margin of median lobe of prementum. Labial palps with 10–13 (11.4 ± 0.23) palpal setae; 12–15 shallow, rounded crenulations on distal margin of palp, each crenulation with 2–4 short spiniform setae diminishing in size dorsally (Fig. 4).

Thorax and wing sheaths brown with dark brown markings on dorsal midline of prothorax and laterally on thorax dorsal to coxae. Legs yellow-brown, coxae and trochanters margined with dark brown. Femora with brown bands, one at apex, a wider one at middle of distal half and one at middle of proximal half; distal bands on metafemora fused in some specimens. Tibiae with dark bands at base and apex, tarsal segments with dark apices. Setae on legs pale, those on tibiae up to 2.0 mm long. Hindwing sheath 5.3–6.6 mm (5.7 ± 0.07 mm) long, extending to anterior margin of abdominal segment 6. Metafemur 5.3–5.7 mm (5.5 ± 0.05 mm), metatibia 6.6–7.3 mm (6.9 ± 0.08 mm) and metatarsus 2.5–2.9 mm (2.7 ± 0.04 mm) long.

Abdomen green-brown with brown punctae; setal bases on posterior margin of segments black. Setae on segment 10 pale, up to 1.7 mm long. Abdomen widest at segment 6, 5.0–5.9 mm (5.5 ± 0.09 mm). Epiproct (Figs. 2 & 3) 1.3–1.4 mm (1.3 ± 0.02 mm) long and 1.0–1.1 mm (1.1 ± 0.01 mm) wide at base; paraprocts 1.6–1.9 mm (1.8 ± 0.03 mm) long; cerci 0.6–0.8 mm (0.7 ± 0.02 mm) long. No dorsal hooks present. Lateral spines short, those on segment eight 0.17–0.26 mm (0.23 ± 0.01 mm) long, or 0.13–0.18 (0.17 ± 0.01) the length of the lateral margin of the segment including the spine; spine on segment nine 0.40–0.50 mm (0.43 ± 0.01 mm) long, 0.23–0.28 (0.25 ± 0.01) the length of the lateral margin of the segment.

Color pattern variable from a light green venter with light green-brown or



Figs. 2-6. *Sympetrum madidum*, final-instar larva. Fig. 2, apex of abdomen, dorsal view; Fig. 3, apex of abdomen, lateral view; Fig. 4, distal margin of labial palp, dorsal view; Fig. 5, left half of prementum and left labial palp, dorsal view; Fig. 6, head, lateral view. Scale lines = 1 mm.

yellow-brown dorsally, to dark brown over most of the body. Lighter larvae may be those which have most recently molted.

Material examined. BRITISH COLUMBIA. Spencer School Pond, Langford, 4 larvae, 4 exuviae (3 reared), 3.VI.1979 (R. A. Cannings); 12 larvae,

9 exuviae (reared), 16.VI.1979 (R. A. Cannings); 4 larvae, 23.VI.1979 (R. A. Cannings). Riske Creek, 1 exuvia 19.VI.1978 (R. A. Cannings). All above specimens located in the Spencer Entomological Museum, University of British Columbia. Measurements and counts are based on ten final instar larvae. Measurements made of all exuviae show no significant differences between them and preserved larvae except in the dimensions of the head which in the exuviae are distorted during emergence.

Diagnosis and remarks. Walker and Corbet (1975) added *Sympetrum madidum* to the subgenus *Tarnetrum*, containing *S. corruptum* and *S. illotum*, on the basis of similar wing venation and genitalia characters. Further, they noted that adult *S. madidum* seemed intermediate between the subgenera *Sympetrum* and *Tarnetrum* (e.g. lack of an accessory transverse carina on abdominal tergite 4). Concerning the reflection of these relationships in larval structures, Walker and Corbet state that the larvae of *S. corruptum* and *S. illotum* "stand apart from other North American *Sympetrum* in lacking dorsal hooks on the abdomen, and in the extreme reduction or absence of lateral spines on abdominal segment 8." The newly discovered larva of *S. madidum* also fits this description, justifying the placement of this species in the subgenus *Tarnetrum*. Like the adult, the larva is a link between the *Tarnetrum* and *Sympetrum* subgenera: the lateral abdominal spines are small, but are not as rudimentary as those of *S. corruptum* or *S. illotum*. They are never absent as is often the case in the latter two species.

Spines on segment 8 average 0.17 the length of the segment (including the spine) compared to 0.10 or less in *S. corruptum* and *S. illotum*. Spines on segment 9 average 0.25 the length of the segment whereas they are less than 0.13 the length in the other two species (Walker and Corbet, 1975; Musser, 1962).

S. madidum is as large (total length 17.8–20.3 mm) as *S. corruptum* (17–19 mm) and *S. illotum* (18 mm). Most other *Sympetrum* larvae measure under 18 mm (Walker and Corbet, 1975).

The number of premental setae ranges from 13–18 but is usually 14–16 while in *S. corruptum* there are 14–18 (usually 16–17) and in *S. illotum* about 13 (Walker and Corbet, 1975). The number of palpal setae in *S. madidum* (10–13, usually 11) also falls between the counts in *S. illotum* (9) and *S. corruptum* (13–15). Several other measurements show the same relationship. The head width is 5.2–5.5 mm compared to 5.0 mm in *S. illotum* and 5.8 mm in *S. corruptum*; the metafemur is 5.3–5.7 mm long in *S. madidum* while in *S. illotum* it is 5.0 mm and in *S. corruptum* 6.5 mm. The cerci in *S. madidum* are always less than 0.45 (0.37–0.44) the length of the paraprocts while in *S. corruptum* they are "about one-half" the length and in *S. illotum* "about two-thirds" the length of the paraprocts (Walker and

Corbet, 1975). A more detailed description of *S. illotum* than is available would enable these three similar larvae to be distinguished more reliably.

Key to the Final Instar Larvae of *Sympetrum* (*Tarnetrum*) Species

1. Dorsal hooks present on abdomen *Sympetrum* (*Sympetrum*)
Dorsal hooks absent *Sympetrum* (*Tarnetrum*) 2
2. Cerci 0.67 the length of paraprocts; palpal setae 9 *illotum*
Cerci 0.50 or less the length of paraprocts; palpal setae 10 or more 3
3. Lateral spines on abdominal segment eight 0.13 or more the length
of segment including spine; those on segment nine 0.23 or more
the lateral length of segment; metafemur less than 6.0 mm long;
palpal setae (on each palp) 10–13, usually 11 or 12 *madidum*
3. Lateral spines on segment eight, if present, about 0.10 or less the
length of the segment including the spine; those on segment nine
less than 0.13 the lateral length of the segment; metafemur 6.0 mm
or longer; palpal setae 13–15 *corruptum*

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